基于支持向量机的有机肥总养分含量NIRS分析 Near-infrared Reflectance Spectroscopy for Total Nutrient Analysis in Organic Fertilizer Using Linear Support Vector Machine

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关键词： 有机肥 养分 支持向量机 偏最小二乘 近红外漫反射光谱

摘　要： 以我国22个省市的120份畜禽粪便为原料的有机肥产品样品为研究对象，利用近红外漫反射光谱法与支持向量机相结合建立了有机肥产品中总养分含量的快速测定模型，并与偏最小二乘法所建模型作了比较。利用偏最小二乘回归法所建立的基于原始样品和干燥粉碎样品的总养分含量近红外模型验证决定系数R2v、预测标准差SEP和验证相对分析误差RPD分别为0.96、7.95g/kg、2.47和0.93、8.02g/kg、3.58。利用支持向量机回归法所建立的干燥粉碎样品中总养分含量的近红外模型验证决定系数R2v、预测标准差SEP和验证相对分析误差RPD分别为0.93、7.38g/kg和3.88。结果表明，近红外漫反射光谱法可以快速测定畜禽粪便为原料的有机肥产品中总养分含量，与偏最小二乘法相比，支持向量机所建模型具有更高的预测精度。 A new method was explored to predict the total nutrient content in organic fertilizer products using near-infrared reflectance spectroscopy (NIRS) with linear support vector machine regression (SVR), compared with partial least-squares regression (PLSR). 120 commercial organic fertilizer samples were collected from 22 provinces in China. Spectra of orient and dried (passed 1mm screen) samples were scanned with a SPECTRUM ONE NTS (PerkinElmer, New Jersey, USA) from 10000 to 4000cm-1 , respectively. NIRS-PLSR models for total nutrient in organic fertilizer products samples on orient and dried basis were developed with the following results: the determination coefficient of validation (R2v), the standard error of prediction (SEP) and RPD (SD/SEP) on orient and dried basis were 0.96, 7.95g/kg, 2.47 and 0.93, 8.02g/kg, 3.58, respectively. The validation results of NIRS-SVR model for total nutrient content on dried basis were R2v 0.93, SEP 7.38g/kg and RPD 3.88. Results showed the feasibility and potential of NIRS to predict total nutrient content in organic fertilizer products, and NIRS-SVR method on dried basis is the best choice.

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